REMARKS / ARGUMENTS

Claims 1-61 are pending in this application. Claims 42-61 are withdrawn due to a restriction requirement made by the Examiner. Claims 1-41 stand rejected. In the Office action mailed August 25, 2003, the Examiner rejected Claims 1-5, 7, 12-14, 16-19, 30-37, and 39-41 under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer and Iida et al. Claims 6 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer and Iida et al., and further in view of Saarenketo. Claims 9 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer and Iida et al., and further in view of Deskins. Claims 11, 20-25, 28 and 29 were rejected under 25 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer and Iida et al., and further in view of Manz et al. Claim 27 was rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer, Iida et al., and Manz et al., and further in view of DeLonge. Claim 15 was rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othmer and Iida et al., and further in view of Burke. Claim 38 was rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. in view of Othemer and Iida et al., and further in view of Nassef et al.

With respect to Claim 1, the Examiner cites Heil et al. as disclosing an apparatus for removal of solids from fluids substantially as claimed except for reciting that the equalization chamber has a solids discharge and the apparatus includes a second stage chemical injection.

The apparatus of the present invention is placed in-line in a fluid transfer system. The pump pushes the raw fluid in one end and separated fluid is pushed out the other end to whatever further treatment or other destination is desired.

Because of the pressure in the system, solids can be drawn off the bottom of the equalization and clarification chambers by simply opening a valve or gate at the bottoms thereof. The pressure in the system forces the solids out as required, while the system continues to operate.

In the prior art of Heil et al., the pump 4 does not keep the fluid moving through the system. It simply adds liquid to the system and gravity is required for the fluid to flow from vessel to vessel and out of the apparatus. It is clear from Figs. 1 and 2 that the pump 4 only adds fluid to the air space in the top of the vessel #1 or the first dome 9. Because the fluid is added to an air space in the first dome 9, the pump 4 does not pressurize the entire system right to the discharge pipe 23 and gravity is required to induce flow of the liquid between the vessels and to discharge fluid from the apparatus at the end, in contrast with the present invention wherein Claim 1 states that "the fluid treatment apparatus between the pumping apparatus and the separated fluids discharge is pressurized by the pumping apparatus". At Col. 6, lines 15-20, Heil et al. clearly discloses that a separate pressure source is needed to pressurize the top of the tanks:

> Supply air for the aeration bubbler heads 7 and 12 and air domes 9 of all vessels 1, 2, and 3 is provided by a suitable rotary compressor 31 suitably connected to manifold 34 and capable of achieving pressures of up to about 35 psig (the

preferred operating pressure in manifold and domes 9 is about 35 psig).

In contrast, the pump of the Applicant's invention could be supplied by an existing pump pumping fluid through an existing fluid line. The equalization and clarification chambers, and necessary connections as described, could simply and economically be added into the fluid line to separate solids from the fluid. The existing pump would force the raw fluid into and through the system, and separated fluid would continue down the fluid line, instead of the raw fluid that flowed in the fluid line prior to adding the apparatus of the present invention.

Because Heil et al. does not disclose a system as stated in Claim 1 "wherein the fluid treatment apparatus between the pumping apparatus and the separated fluids discharge is pressurized, by the pumping apparatus" Heil et al. requires the use of significantly different elements to transport the mixed liquor from the first stage of the apparatus to the second stage. Claim 1 specifies the "clarification chamber" is "operatively attached to the top of the equalization chamber via a second stage fluid transfer conduit (19)", which Heil et al. does not disclose. Because the apparatus of Claim 1 is pressurized throughout by the pumping apparatus, the second stage fluid transfer conduit (19) can be attached to the top of the equalization chamber and the pressure in the system will cause the fluid to be pushed out the top of the equalization chamber and flow through the second stage fluid transfer conduit (19) into the clarification chamber. Since solids settle downward, the fluid at the top of the equalization chamber is the clearest and it is this clearest fluid that moves through the second stage fluid transfer conduit (19) into the clarification chamber.

Heil et al. lacks a completely pressurized system because of the air pockets at the top of the tanks (air domes 9) and pressure manifold 35 and therefore requires different elements to connect the first stage of treatment to the second stage of treatment. Heil et

al. discloses that fluid transfer between the stages in the apparatus requires a conduit attached to an overflow/transfer box 13 located roughly halfway up the side of the second aeration tank or compartment and a corresponding pressure manifold 35. From Heil et al. at Col. 5 lines 33-45:

> The level of mixed liquor in both the aeration compartments of vessels #1 and #2 is controlled by the overflow/transfer box 13 (located in the compartment of vessel #2), from whence the fully aerated mixed liquors enters conduit 14 and flows into the cyclone separator compartment 15 of vessel #3 in tangent relation to the cylindrical wall of vessel #3 defining compartment 15, and in between same and the annular, tubular cone 20 that is suitably mounted in vessel #3.

Even further Heil et al. goes on to disclose that a pressure manifold 35 is required as a necessary element to transfer the mixed liquor from vessel #2 to vessel #3 and further highlights the necessity of placing the opening of the conduit 14 below the surface of the mixed liquor in the tank at Col. 6, lines 36-44:

> Pressure manifold 35 provides for equalization of air pressure between all three pressure vessels #1, #2, #3 thereby creating a common atmosphere at the indicated pressure level within the process system in which the liquid can move by gravity flow without necessitating complex valve controls. Spent air in the system is exhausted through suitable pressure relief valve 36 which also is suitably set to regulate air pressure in the system at the indicated preferred pressure level.

Heil et al. clearly discloses that the mixed liquor moves from vessel #2 to vessel #3 by gravity flow rather than pressure. This necessitates the addition of an overflow/transfer box 13 surrounding the opening of the conduit 14 and locating the opening of the conduit below the surface of the mixed liquor in vessel #2. It also necessitates the use of a pressure manifold 35 to prevent pressure differences between the vessels which could

equal the force of gravity on the mixed liquor flow and prevent the mixed liquor from progressing through the system from vessel #2 to vessel #3. The applicant respectfully submits that Heil et al. does not as the examiner has stated disclose a device as claimed except for the solids discharge in the equalization chamber and the second stage discharge.

The applicant respectfully submits that it would not be obvious to add a solids discharge as shown in Othmer to either vessels #1 or #2 as disclosed in Heil et al. because the intended functions of the apparatus disclosed in Heil et al. would be destroyed. Heil et al. clearly discloses that vessels #1 and #2 have aerator heads 7 and 12 located at the very bottom of the vessels and it also clearly discloses what the purpose of these aerator heads are. From Heil et al. starting at Col 4, line 62 and ending at Col 5, line 15:

> The mixed liquor (wastewater and return sludge) in compartment #1 is dosed with a continuous stream of air bubbles 8 rising from aerator head 7 located in the bottom of the compartment of vessel #1. The diffused air bubbles 8 become attached to the sludge floc and bouy it upwards to the interface of the vessel #1 air dome 9, where the floc is further saturated with air before sinking downwards along the walls of compartment of vessel #1.
>
> Oxygen transfer to the mixed liquor occurs through diffusion of air bubbles from aerator head 7 into the liquor and from a rolling interface of the liquor with the air dome 9. Elevated pressure within the aeration compartment (preferably about 35 pounds per square inch guage) provides an extremely efficient driving force for transfer of oxygen into the mixed liquor. The mixed liquor within the compartment of vessel #1 cycles continuously upward above the diffuser head 7, and downward near the perimeter of the compartment defined by vessel #1, eventually flowing out (by gravity) through conduit 10 into the aeration compartment defined by vessel #2.

And Col 5, lines 24-32:

> Whereas full air flow to diffuser head 7 is to and does create a vigorous boil in the

> compartment of vessel #1, the throttled air supply to diffuser head 12 can be and is adusted to produce only a gentle rolling action that enhances flocculation yet is sufficient to satiate oxygen demand. When the sludge floc finally leaves the aeration compartment defined by vessel #2, it is strong and dense, settles easily, and has virtually assimilated all the organic waste in the wastewater.

Heil et al. cannot add solid discharges to vessels #1 and #2 for two reasons. First, Heil et al. discloses the use of aeration tanks and solids in the mixed liquor or fluid will not settle out in an aeration tank. In addition to increasing the oxygen content in the mixed liquor, one of the primary purposes of the diffuser heads 7 and 12 in the aeration tanks is to constantly circulate the mixed liquor around the tank or vessel and to prevent the solids from settling to the bottom of the vessel. The reason that the diffuser heads 7 and 12 are placed at the very bottom of the vessel is to prevent any solids from settling out by re-circulating the mixed liquor from the lowest point. Othmer notes the importance of "minimizing agitation" in fluids where solids will be settled out. From Othmer at Col 4, lines 3-11 regarding the tank 10 that discloses the use of a solid discharge 19, Othmer states:

> The discharge line, 6, of the pump, may lead to a lower valved connection, 7, of the pressure tank, 10, with an internal sparger, 16, having many small holes - or other system to give uniform distribution of the influent across the cross-section of 10, and also to minimize agitation. Alternatively, the liquid may be passed to a higher point, and a spray head, 14, for generating a spray, 15, of the liquid into the space, 11, for accumulation of gas over the space, 12, filled with liquid.

For a solids discharge to function, solids must be settled out of the fluid. One of the primary purposes of the diffuser heads 7 and 12 disclosed in Heil et al. is to prevent exactly the situation that is required for a solid discharge to be added to the base of the vessel. Secondly, because the diffuser heads 7 and 12 are placed at the bottom of the tank, if the

air pressure at the diffuser heads 7 and 12 was reduced to some solids to settle, the solids settling out of the mixed liquor or fluid would settle over the diffuser heads 7 and 12 and prevent the diffusor heads 7 and 12 from working and in turn render the aeration tanks themselves non-functional. The applicant respectfully submits that aeration tanks, which Heil et al. teaches, cannot be used in place of sedimentation tanks or equalization chambers to settle solids out of a fluid.

The applicant also submits that in order to modify Heil et al. with the solids discharge of Othmer the diffuser heads 7 and 12 must be removed thus destroying the function of the aerator vessels #1 and #2 and rendering them inoperative and in opposition to the teachings of Heil et al.

For all of the above reasons the applicant respectfully submits that Claim 1 is not rendered obvious by the cited prior art and therefore dependant Claims 2-41 are also not rendered obvious by the cited prior art.

Applicant has made an earnest effort to be fully responsive to the Examiner's objections and believes that Claims 1 - 41 are now in condition for allowance. The applicant respectfully requests that a timely notice of allowance be issued in this case. If the Examiner believes there are additional issues that remain for discussion in this application he is invited to contact the undersigned attorney at the telephone number or email address listed below prior to issuing a further Action.

Respectfully submitted,

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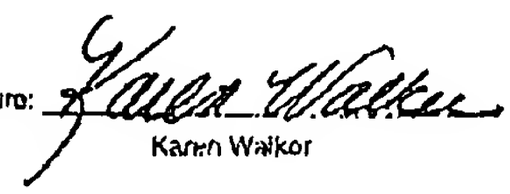
Signature: 
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